

Viscous dissipation in the upper part of rock core in Europa

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Voyager and Galileo observations on Europa suggest the existence of a liquid water ocean (internal ocean) under the icy crust. A heating due to the tidal interaction with Jupiter is supposed to be prevented the freezing of the internal ocean, however, the detail mechanism of tidal heating is currently unclear.

In this study, we focus the boundary between the internal ocean and rock core in Europa. We also assume the upper part of rock core as the porous media. In order to estimate the heating rate generated by the episodic tidal force, we simulate the viscous pipe flow approximated by the small area of porous media. As a result of this simulation, we have found that the episodic tidal effect can generate the significant heat flux at the upper part of rock core.